ABSTRACT

A method for rapid, fully automatic, two-dimensional (2-D) and three-dimensional (3-D) tracing of line-structure images, such as images of neurons produced by fluorescence confocal microscopy. A method of recursively following the line-structure topology, guided by the correlation response of a set of 4 x N^2 directional kernels in the 3-D case, and a set of 2 x N directional kernels in the 2-D case, is presented. These kernels are derived based on a generalized cylinder model of the line-structures. The automatic tracing method includes a protocol for determining the ends of line-structures.